

### ***In the Specification***

1. Please replace the heading “Disclosure of the Invention” on page 3 with the following amended heading:

#### **[[Disclosure]] Summary of the Invention**

2. Please replace the second full paragraph on page 4 with the following amended paragraph:

Bob’s modulator voltage  $V_B$  is then set to a negative value (e.g.,  $V_B(2) = V_B(-\pi/4)$ ) and the process repeated to obtain two more nominal basis voltages and for Alice, namely  $V_A(3) = V_A(\pi/4)$  and  $V_A(4) = V_A[-3\pi/4]$ . When all of the basis voltages are set (calibrated), the QKD system is operated to verify orthogonality between the basis voltages. This is accomplished by purposely selecting “incorrect” basis voltage values at Bob and Alice and measuring the probability distribution of detecting a photon at each of two detectors. If the probability distribution is not 50:50, one or more of Bob’s modulator basis voltage values  $V_B(1)$  and  $V_B(2)$  is/are adjusted and the above-described process repeated until a detector count probability distribution of 50:50 is obtained for the “incorrect” measurement bases. This establishes orthogonality between the established basis voltages and provides calibrated basis voltage values  $V_B(1)$  and  $V_B(2)$  for Bob and  $V_A(1)$ ,  $V_A(2)$ ,  $V_A(3)$  and  $V_A(4)$  for Alice.

3. Please replace the heading “Detailed Description of the Best Mode of the Invention” near the bottom of page 4 with the following amended heading:

#### **Detailed Description of the [[Best Mode of the]] Invention**

4. Please replace the first paragraph under the heading “modulator timing set-up” that starts at the bottom of page 7 and carries over to page 8 with the following amended paragraph:

The description above is based on the idealized operation of a two-way QKD system. However, in practice, such systems do not automatically operate in an ideal state. Further, a commercially realizable system must first be set up to operate at or close to an ideal state, and then must be able to compensate for changes in its operating state to ensure ongoing operation in or close to the ~~idea~~ ideal operating state. The autocalibration methods set forth below presume that the modulator timing in QKD system 100 has been established via synchronization channel SL via synchronization signals SS.

5. Please add the following new paragraph as the last paragraph after the last paragraph on page 11 and immediately prior to the claims section:

In the foregoing Detailed Description, various features are grouped together in various example embodiments for ease of understanding. The many features and advantages of the present invention are apparent from the detailed specification, and, thus, it is intended by the appended claims to cover all such features and advantages of the described apparatus that follow the true spirit and scope of the invention. Furthermore, since numerous modifications and changes will readily occur to those of skill in the art, it is not desired to limit the invention to the exact construction, operation and example embodiments described herein. Accordingly, other embodiments are within the scope of the appended claims.